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EXAMINER	
ALI, SYED J	

ART UNIT	PAPER NUMBER
2127	10

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/436,618	PARKES ET AL.	
	Examiner	Art Unit	
	Syed J Ali	2127	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to Amendment B, paper number 9, which was filed December 19, 2003. Claims 1-38 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

Claim Rejections - 35 USC § 103

3. Claims 1, 6, 10-11, 28, 32, and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif et al. (previously cited) (hereinafter Hanif) in view of Browning et al. (USPN 6,633,897) (hereinafter Browning).

As per claim 1, Hanif teaches the invention as claimed, including a method of carrying out a procedure on a computer system having a memory, the memory containing user context data and global data, comprising:

executing a first server, wherein the first server defines a computer-executable function for performing a first sub-task of the procedure (col. 1 line 65 - col. 2 line 5, "The file server includes file server software that is implemented as a multithreaded process. Network tasks are broken into sub-tasks and assigned to individual threads for further processing");

manipulating the global data to carry out the first sub-task (col. 5 lines 19-40, "One aspect of the present invention is to increase the throughput of the file server software 24' using

multiple threads of execution. According to the present invention...a second plurality of global threads 204 is assigned to the global queue 200 for processing command-type requests");

sending the user context data to a second server (col. 6 lines 12-29, "the work of processing requests is divided into two phases, initialization and queuing, to further improve performance", "The last step 256 in the initialization phase is to make N number of SPGetRequest calls to the ATP to initiate the listening of requests", wherein the process of making SPGetRequest calls completes the initialization, i.e., the first sub-task, and the calls to the ATP sends local, i.e., user, data to the second server to complete queuing, i.e., the second sub-task);

executing the second server, wherein the second server defines a computer-executable function for performing a second sub-task of the procedure (col. 6 lines 30-38, "the ATP 120 receives the request from the SLS 170 in step 270, and then the ASP 130 places the request into the local queue 190 for processing"); and

manipulating the global data to carry out the second sub-task using the user context data (col. 6 lines 30-38, "the ATP 120 receives the request from the SLS 170 in step 270, and then the ASP 130 places the request into the local queue 190 for processing").

Browning teaches the invention as claimed, including the following limitations not shown by Hanif, specifically wherein the first and second servers are optimized to execute in cache (col. 3 lines 10-27, "When data requested by a processor 30 is not resident within its associated L1 cache 32, processor 30 will attempt to load the requested data from an associated L2 cache 34, which comprises an optional second level within the memory hierarchy"), such that global data for each server is given priority over user context data (col. 3 lines 10-67, "When data requested

by processor 30 is not resident within its associated L1 cache 32 or L2 cache 34, the data request is forwarded to global memory 36, which is accessible to each processor", "global memory 36 includes global execution queue 40 which lists threads which are executable, but are not currently being executed by one of processors 30", "Global dispatch flag 48 is set to indicate that the priority of a thread added to global execution queue 40 is greater than the priority of a thread currently being executed by one of processors 30").

It would have been obvious to one of ordinary skill in the art to combine Hanif and Browning since optimizing the execution such that necessary data is available in cache significantly improves the performance therein. Specifically, memory reads are very slow in comparison to cache reads, and ensuring that all necessary data is available in the cache would thus reduce the time required to pull data noticeably. Furthermore, to give priority to global data over user data would have been obvious since the global data is pertinent to a wider range of the system. For instance, in the case of Browning, multiple processors are used to carry out execution of threads. When data is retrieved and put into memory, the data retrieved is global data which is available to all processors. On the other hand, processor-specific or user-specific data is only pertinent to one processor, and thus takes up space in memory that could be used more efficiently. Thus, the combination of Hanif and Browning provides a way of reducing the execution time of a process or thread by ensuring that data necessary for performing operations are available in cache, and that a maximal amount of the data available in global memory is available for all processors to use.

As per claim 6, Browning teaches the invention as claimed, including the method of claim 1, wherein the computer system has a first CPU and a second CPU, and the cache is comprised of a first area usable by the first CPU and a second area usable by the second CPU, and the executable code of the first server is optimized to fit in the first area and the executable code of the second server is optimized in the second area (Fig. 2 elements 30, 32, 34, wherein each of elements 30 is a processor, and each has an L1 and L2 cache associated with it). Furthermore, since multiple processing elements are shown and each has its own assigned cache, the execution optimization, as discussed above in reference to claim 1, would execute in the respective caches.

As per claim 10, the modified Hanif teaches the invention as claimed, including the method of claim 1, wherein the computer system has a plurality of CPUs, and at least one server executes on only one CPU at a time (Browning discloses a multiprocessor system in Fig. 1, and Hanif discloses multiple servers executing together to perform a larger task. That is, a request is made, and a response is made to service that request. It is not unreasonable to presume that in the case of data dependencies, etc., there may be cases when only one of the servers can execute at a time to preserve data integrity, specifically in the case of speculative operation or branch-predictive execution methods).

As per claim 11, the modified Hanif teaches the invention as claimed, including the method of claim 1, wherein the computer system has a plurality of CPUs, and at least two instances of one of the servers execute concurrently on different CPUs (see discussion of claim

10 pertaining to multiprocessor systems. Furthermore, Hanif discloses servers made up of multithreaded processes, which by definition, support execution of concurrent threads).

As per claim 28, it is rejected for similar reasons as stated above for claim 1. Specifically, since Hanif and Browning are specifically related to system and methods in a computer system, it is inherent that a computer-readable medium having computer-executable instructions for performing the method of claim 1 must exist.

As per claims 32 and 36-37, all of the limitations therein are similar to those of claims 6, and 10-11. Therefore, the discussion of claims 6 and 10-11 provide the basis for rejection of the present claims as well.

4. Claims 2-4, 13-16, 18, 20-21, 23-27, 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Ghodrat et al. (previously cited) (hereinafter Ghodrat).

As per claim 2, Ghodrat teaches the invention as claimed, including the following limitations not shown by the modified Hanif, specifically the method of claim 1, further comprising storing the user context data in a work packet and sending the work packet from the first server to the second server, wherein the work packet contains an action code for describing an action to be performed by the second server (col. 4 lines 36-50, "the asynchronous receive DMA is located within receive DMA (RDMA) unit 314 and contains two DMA contexts, a

request handler and a response handler", wherein the request handler submits a work packet to a second context containing an action code telling the second server how to respond to the request).

It would have been obvious to one of ordinary skill in the art to combine the modified Hanif and Ghodrat since Hanif discloses a way of processing requests by having one server handle the request and another handle the response. By adding Ghodrat, a way of transferring the request calls in a data structure such as a packet is provided, which reduces network traffic and encapsulates all data associated with system calls.

As per claim 3, Ghodrat teaches the invention as claimed, including the method of claim 2, wherein the work packet contains a reply state, and the method further comprises: causing the second server to update the work packet by replacing the value contained in the action code with the value contained in the reply state; and causing the second server to send the updated work packet back to the first server (col. 4 lines 36-50, "the asynchronous receive DMA is located within receive DMA (RDMA) unit 314 and contains two DMA contexts, a request handler and a response handler", wherein Ghodrat provides a way of transferring packets, and provides a response handler for such a transaction). Further, as discussed above, Hanif provides a way of handling requests and responses without specifying the mode of transferring data. Rather, Hanif simply refers to the requests as "SPGetRequest calls". The method of Ghodrat provides a way of defining a data structure that could be implemented in Hanif to transfer retrieved data back to the first server upon issuance of the request for retrieval from memory.

As per claim 4, Ghodrat and Hanif teach the invention as claimed, including the method of claim 1, further comprising: in response to receiving a first work packet containing the user context data; causing the first server to partly perform the first sub-task using the first work packet (see above discussion of claim 1); sending a second work packet containing the user context data from the first server to the second server; causing the second server to perform the second sub-task using the second work packet and store a result of the second sub-task in the second work packet; and sending the second work packet from the second server to the first server, wherein the result is useable by the first server to complete the performance of the first sub-task (col. 4 lines 36-50, "the asynchronous receive DMA is located within receive DMA (RDMA) unit 314 and contains two DMA contexts, a request handler and a response handler", wherein Ghodrat describes a way of transferring data packets of different contexts through a single interface, and used in combination with the request calls of Hanif, allows a way of splitting requests and responses into sub-tasks, thereby allowing different multithreaded processes to perform various sub-tasks of the procedure).

As per claims 13-16, 18, and 20-21, all of the limitations therein are similar to those of claims 1-4, 6, and 10-11. Therefore, the discussion of claims 1-4, 6, and 10-11 provide the basis for rejection of the present claims as well.

As per claim 23-25, all of the limitations therein are similar to those of claims 1-3. Specifically, Hanif discloses a computer-readable medium defining servers for performing sub-tasks of a procedure. In addition, Ghodrat discloses a work packet for transferring user context

information. Therefore, the discussion of claims 1-3 provide the basis for rejection of the present claims as well

As per claims 26-27, all of the limitations therein are similar to those of claims 1-4. Therefore, the discussion of claims 1-4 provide the basis for rejection of the present claims as well. The disclosure of all of Hanif, Browning, and Ghodrat are specifically related to computer systems, particularly networks and data transfer. Therefore, it is inherent that a computer-readable medium must exist to store various data as well as instructions for executing the above described methods.

As per claims 29-31, all of the limitations therein are similar to those of claims 2-4. Therefore, the discussion of claims 2-4 provide the basis for rejection of the present claims as well.

5. Claims 5, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Ghodrat and further in view of Austvold et al. (previously cited) (hereinafter Austvold).

As per claim 5, Austvold teaches the invention as claimed, including the following limitations not shown by the modified Hanif, specifically the method of claim 4, wherein the second work packet is linked as a child to the first work packet (col. 3 lines 9-45, "a WorkUnit object could further subdivide the work packet down into smaller multiple work packets

represented by other WorkUnit objects. These WorkUnit objects have a parent-child relationship in which a child WorkUnit will return to its parent WorkUnit when the child WorkUnit is complete with its specific work packet").

It would have been obvious to one of ordinary skill in the art to combine the modified Hanif and Austvold since the disclosure of Austvold provides a way of permanently linking a work request with its response. Since Hanif deals mainly with such requests and responses, the disclosure of Austvold would fit in well with Hanif thereby allowing a way of ensuring that a response to a request is properly handled.

As per claim 17 all of the limitations therein are similar to those of claim 5. Therefore, the discussion of claim 5 provides the basis for rejection of the present claim as well.

6. Claims 7 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Vitter et al. (previously cited) (hereinafter Vitter).

As per claim 7, Vitter teaches the invention as claimed, including the following limitations not shown by the modified Hanif, specifically the method of claim 1, wherein the procedure is a search of a database index tree containing a plurality of nodes, the first sub-task is to examine a node and the second sub-task is to perform an input/output operation for retrieving the node from memory and storing the node in cache (col. 3 line 61 - col. 4 line 3, "For caching, the data structure is paged. It is assumed that every node of the tree, except may the root, fits in one page of memory.", "Pages containing nodes not in cache are maintained in a larger

secondary memory, e.g., a disk or even in a database. When such a node is required, it is paged or fetched into cache").

It would have been obvious to one of ordinary skill in the art to combine the modified Hanif and Vitter since caching allows a process to execute much faster than retrieving data from memory. Various techniques are known that predict when a node may need to be fetched. Furthermore, this fits well within the disclosure of Hanif since Hanif discloses breaking a procedure up into subtasks. In this regard, it is possible that one sub-task can retrieve data from memory and place it in cache, while the other sub-task concurrently is executing on data already stored in cache.

As per claim 33, all of the limitations therein are similar to those of claim 7. Therefore, the discussion of claim 7 provides the basis for rejection of the present claims as well.

7. Claims 8, 19, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Vitter in view of Ghodrat.

The combination of Hanif, Browning, Vitter, and Ghodrat show all the limitations of claim 8. Specifically, Vitter teaches the invention as claimed, including determining if a node is in cache, and if not retrieving the node from the database in main memory and putting the node into cache (see discussion of claim 7). Furthermore, Ghodrat teaches the invention as claimed, including the use of work packets executing on different contexts to service requests and receive responses (see discussion of claim 2). It would have been obvious to one of ordinary skill in the

art to combine these references to arrive at the claimed invention since it would allow a way of breaking a procedure such as operating on a specific portion of a database into separate tasks, thereby reducing overhead and improving performance. By allowing this execution to take place in the cache, the performance is further improved. Also, sending requests and responses through work packets allows a standardized data structure to perform all actions, therefore increasing the scalability of the system.

As per claim 19 all of the limitations therein are similar to those of claim 7. Therefore, the discussion of claim 7 provides the basis for rejection of the present claim as well.

As per claim 34, all of the limitations therein are similar to those of claim 8. Therefore, the discussion of claim 8 provides the basis for rejection of the present claims as well.

8. Claims 9 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Vitter in view of Ghodrat in view of Austvold.

As per claim 9, Austvold teaches the invention as claimed, including the method of claim 8, wherein the first work packet contains a reference to a parent work packet (col. 3 lines 9-45, "a WorkUnit object could further subdivide the work packet down into smaller multiple work packets represented by other WorkUnit objects. These WorkUnit objects have a parent-child relationship in which a child WorkUnit will return to its parent WorkUnit when the child WorkUnit is complete with its specific work packet").

It would have been obvious to one of ordinary skill in the art to add Austvold to the modified Hanif since the disclosure of Austvold provides a way of permanently linking a work request with its response. Since Hanif deals mainly with such requests and responses, the disclosure of Austvold would fit in well with Hanif thereby allowing a way of ensuring that a response to a request is properly handled.

As per claim 35, all of the limitations therein are similar to those of claim 9. Therefore, the discussion of claim 9 provides the basis for rejection of the present claims as well.

9. Claims 12, 22, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanif in view of Browning in view of Ghodrat in view of Doi et al. (previously cited) (hereinafter Doi).

As per claim 12, Doi teaches the invention as claimed, including the following limitations not shown by the modified Hanif, specifically the method of claim 1, wherein the computer system has a first CPU and a second CPU, and the work packet has a designated value, and wherein one of the servers executes on the first CPU when the designated value falls within a first range and executes on the second CPU when the designated value falls within a second range. Specifically, Doi discloses prior art (fig. 9, col. 2 lines 55-62, "there frequently occurs a case that the retrieving server [processor] the retrieval data belongs to differs from the retrieving server [processor] which conducts the retrieval processing of that retrieval data", wherein when a retrieval request is submitted, there is communication between the retrieval servers so that when

a request is issued for which the data falls in a particular range, the correct retrieval server performs the request). In this sense, this communication allows for specific processors to conduct retrieval on a specific range, and if that range is not allocated to that server, the communication link allows the request to be handled correctly.

It would have been obvious to one of ordinary skill in the art to combine the modified Hanif and Doi since both pertain to information retrieval methods, as well as dividing that information retrieval into sub-tasks for simplified processing. Furthermore, Doi provides the added benefit of allowing processors to only search out data on specific ranges, thereby increasing the predictability of the data retrieval, and therefore making caching of data a quicker, more reliable process.

As per claim 22 all of the limitations therein are similar to those of claim 12. Therefore, the discussion of claim 12 provides the basis for rejection of the present claim as well.

As per claim 38, all of the limitations therein are similar to those of claim 12. Therefore, the discussion of claim 12 provides the basis for rejection of the present claims as well.

Conclusion

10. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (703) 305-8106. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (703) 305-9678. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
February 24, 2004

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